National Climatic Data Center

DATA DOCUMENTATION

FOR

DSI-6500
NEXRAD LEVEL II

December 23, 2003

National Climatic Data Center
151 Patton Ave.
Asheville, NC 28801-5001 USA

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1.   Abstract: Weather **S**urveillance **R**adar - 19**88 D**oppler (WSR-88D), or **NEX**t Generation RADar (**NEXRAD**), Level II data are the base digital data produced by the signal processor (mean radial velocity, reflectivity, and spectrum width) at the full spatial and temporal resolution of the radar. Level II data also contain status messages, performance/maintenance data, volume scan strategy, clutter filter bypass map, and wideband communication console messages. These are the same data transmitted over high-speed, wideband communications to the WSR-88D Radar Product Generator (RPG) for processing by the meteorological analysis algorithms.

Initially it was thought that Level II recorders would be used at selected sites, and only when significant weather events were taking place. As system development has progressed, it became evident that the Level II data would be of vital importance to ensure proper calibration of the radars and for use by researchers to investigate events in more detail than would be possible by using the Level III products. The Level II data can also be used to test revised algorithms that may later be applied to operational use. Level II recorders are installed at all WSR-88D sites.

The vast amounts of data collected at the Radar Data Acquisition site made it mandatory that economically feasible recording devices and media be used. It was determined that EXABYTE tape drives and 8mm tapes would be the most viable system. Depending on operation of the radar, and the recorder model used, one tape may be filled every 1.8 days for each site. Data grade tapes are used for recording and archiving. Initially, sites were equipped with EXABYTE 8200 recorders. These tapes can contain up to 2.3 gigabytes per tape. Recorders currently in use are 8500's which record at higher density with up to 4.7

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gigabytes per tape.

Also available are 8500c (capable of recording in a standard compressed mode), and the newest model - 8505 which is a half height drive fully downward compatible. The 8505 records up 4.7 gigabytes in an uncompressed mode.

This documentation applies to all individual datasets for Doppler RADAR data nation wide.

The Weather Surveillance Radar - 1988 Doppler (WSR-88D) data sets are:

KABR	ABERDEEN SD	KBHX	EUREKA CA
KENX	ALBANY NY	KEYX	EDWARDS AFB CA
KABX	ALBUQUERQUE NM	PAPD	FAIRBANKS AK
KAMA	AMARILLO TX	KFSX	FLAGSTAFF AZ
PAHG	ANCHORAGE AK	KFDR	ALTUS AFB OK
KFFC	ATLANTA GA	KHPX	FT CAMPBELL KY
KEWX	AUSTIN TX	KEOX	FT RUCKER AL
KBBX	BEALE AFB CA	KPOE	FT POLK LA
PABC	BETHEL AK	KFWS	DALLAS/FT WORTH TX
KBLX	BILLINGS MT	GGT	GEORGETOWN BAHAMAS
KBGM	BINGHAMTON NY	KGGW	GLASGOW MT
KBMX	BIRMINGHAM AL	KGLD	GOODLAND KS
KBIS	BISMARCK ND	KGJX	GRAND JUNCTION CO
KCBX	BOISE ID	GDT	GRAND TURK BAHAMAS
KBOX	BOSTON MA	KGRR	GRAND RAPIDS MI
KBRO	BROWNSVILLE TX	KTFX	GREAT FALLS MT
KBUF	BUFFALO NY	KGRB	GREEN BAY WI
KCXX	BURLINGTON/COLCHESTER VT	KGSP	GREER SC
KFDX	CANNON AFB NM	KRMX	GRIFFISS AFB NY
KICX	CEDAR CITY UT	PGUA	ANDERSEN AFB GUAM
KCBW	HOULTON ME	KHGX	HOUSTON/GALVESTON TX
KILX	LINCOLN IL	KHDX	HOLLOMAN AFB NM
KCCX	STATE COLLEGE PA	KUEX	HASTINGS NE
KGRK	FORT HOOD TX	KIND	INDIANAPOLIS IN
RKSG	CAMP HUMPHREYS KOREA	KJAN	JACKSON MS
KCLX	CHARLESTON SC	KJKL	JACKSON KY
KRLX	CHARLESTON WV	KJAX	JACKSONVILLE FL
KCYS	CHEYENNE WY	PAEI	SITKA AK
KLOT	CHICAGO IL	PDON	KAMUELA HI
KILN	CINCINNATI OH	KEAX	KANSAS CITY MO
KCLE	CLEVELAND OH	KBYX	KEY WEST FL
KCAE	COLUMBIA SC	PAKC	KING SALMON AK
KGWX	COLUMBUS AFB MS	KMRX	KNOXVILLE-TRI CITIES TN
KAMX	MIAMI FL (WAS CORAL GABLES)	KARX	LA CROSSE WI
KCRP	CORPUS CHRISTI TX	LPLA	LAJES AFB AZORES
KFTG	DENVER CO	KLCH	LAKE CHARLES LA
KDMX	DES MOINES IA	KESX	LAS VEGAS NV
KDTX	DETROIT MI	KDFX	LAUGHLIN AFB TX
KDDC	DODGE CITY KS	KLZK	LITTLE ROCK AR
KDOX	DOVER AFB DE	KVTX	LOS ANGELES CA
KMXX	MAXWELL AFB AL	KLVX	LOUISVILLE KY
KDLH	DULUTH MN	KLBB	LUBBOCK TX
KDYX	DYESS AFB TX	KMQT	MARQUETTE MI
KEVX	EGLIN AFB FL	KMAX	MEDFORD OR
KMVX	GRAND FORKS ND	KMLB	MELBOURNE FL
KEPZ	EL PASO TX	KNQA	MEMPHIS TN
KLRX	ELKO NV	PAIH	MIDDLETON AK

KMAF	MIDLAND TX	KRIW	RIVERTON WY
KMKX	MILWAUKEE WI	KFCX	ROANOKE VA
KMPX	MINNEAPOLIS MN	KJGX	ROBINS AFB GA
KMBX	MINOT AFB ND	KDAX	SACRAMENTO CA
KMSX	MISSOULA MT	KMTX	SALT LAKE CITY UT
KMOB	MOBILE AL	KSJT	SAN ANGELO TX
PTEJ	MOLOKAI HI	KNKX	SAN DIEGO CA
KMHX	MOREHEAD CITY NC	KMUX	SAN FRANCISCO CA
KOHX	NASHVILLE TN	TCBR	SAN JUAN PR
KLIX	NEW ORLEANS LA	KHNX	SAN JOAQUIN VALLEY CA
KOKX	NEW YORK CITY NY	KATX	SEATTLE WA
PAEC	NOME AK	KFSD	SIOUX FALLS SD
KAKQ	NORFOLK VA	KOTX	SPOKANE WA
KAPX	GAYLORD MI	KSGF	SPRINGFIELD MO
KLNX	NORTH PLATTE NE	KSHV	SHREVEPORT LA
KTLX	OKLAHOMA CITY OK	PDHB	SOUTH SHORE HI
KOAX	OMAHA NE	PHKI	SOUTH KAUAI HI
KPAH	PADUCAH KY	KLSX	ST LOUIS MO
KPDT	PENDLETON OR	KLWX	STERLING VA/
KDIX	PHILADELPHIA PA		BALTIMORE/WASHINGTON DC
KIWA	PHOENIX AZ	KTLH	TALLAHASSEE FL
KPBZ	PITTSBURGH PA	KTBW	TAMPA FL
KSFX	POCATELLO ID	KTWX	TOPEKA KS
KGYX	PORTLAND ME	KINX	TULSA OK
KRTX	PORTLAND OR	KEMX	TUCSON AZ
KPUX	PUEBLO CO	KVNX	VANCE AFB OK
KDVN	DAVENPORT IA	KVBX	VANDENBURG AFB CA
KRAX	RALEIGH NC	KICT	WICHITA KS
KUDX	RAPID CITY SD	KLTX	WILMINGTON NC
KRGX	RENO NV	KYUX	YUMA AZ

2.   **Element Names and Definitions:**

FORMAT:

HEADER FILE: The first file on tape contains only one 31616 byte record. This record is called the header record.

HEADER RECORD: This 31616 byte "physical record" is divided into 494 "logical records" of 64 bytes each. The convention here is to begin with position 1 as the first byte.

POSITIONS	FORMAT	DESCRIPTION
1 - 8	C*8	Always ARCHIVE2
9 - 12	C*4	4-letter site ID. e.g. KLMB
13 - 18	C*6	NCDC tape number. e.g. N00001
19		Blank
20 - 28	C*9	Date tape written. dd-MMM-yy e.g. 19-FEB-93
29		Blank
30 - 37	C*8	Time tape written. hh:mm:ss. e.g. 10:22:59

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38		Blank
39 - 43	C*5	Data Center writing tape: RDASC or NCDC (Left justified, blank filled)
44 - 48	C*5	WBAN Number of this NEXRAD site. (This is a unique 5-digit number assigned at NCDC. Numbers are contained in the NCDC NEXRAD Station History file. The file also contains the four letter site ID, Latitude, Longitude, Elevation, and common location name.)
49 - 50	C*5	Tape output mode. Current values are 8200, 8500, 8500C
54 - 58	C*5	A volume number to be used for copies and extractions of data from tapes. The form would be VOL01,VOL02,VOL03...VOLnn.
59 - 64		Blank (Available for future use.)
65 - 31616		May be used for internal controls or other information at each archive center. Information of value to users will be documented at the time of tape shipment.

During the process of copying archive tapes, positions 1-18 and 44-48 would be duplicated. New values would be written in positions 19-43 and 49-58.

DATA FILES:

A data file contains a title, a complete radar volume scan (360 degree revolutions at each specified elevation cut) of base data, digital radar data message, and any control/response messages from the RDA to the RPG. A new data file is created upon completion of a volume scan. The title is the first record located on each data file and contains a file name, creation date, and creation time.

Following the title record through the remainder of the data file, variable length records containing base data intermixed with control/response messages are recorded. Messages and base data are distinguishable by a message header coded for either digital radar base data or one of the thirteen types of messages. The message header uses a format common to both data or messages and is included in each 2432 byte packet. Depending on the predefined volume scan strategy (selected elevations, sweep rate, pulse rate etc.) used during the collection period, each data file could contain either five, six, or ten minutes of base data. Control/response messages are used during actual operations and are of limited use for post analyses.

DATA TYPES SUPPORTED WITHIN DATA FILES:

A Concurrent minicomputer serves as the host computer for generation of all Archive Level II data. Depending on the computer used for reading the tapes, the data types may be different from that used in the Concurrent system. The Concurrent computer byte (8 bits) structure places bit 0 as the left most bit and designates bit 0 as the Most Significant Bit (MSB). Bit 7 for a byte, bit 15 for a halfword (2 bytes), bit 31 for a fullword (4 bytes) and bit 63 for a

double word (8 bytes) are all the Least Significant Bit (LSB) for their respective data formats.

Level II is recorded using the following data types:

Unsigned byte (byte) - number ranging from 0-255

Character (C) - Standard ASCII characters

Signed Short Integer (I*2) - Most Significant Bit (MSB) is the sign bit (bit 0). (1-Negative, 0-Positive).

Signed Long Integer (I*4) - MSB (bit 0) is the sign bit.
Single Precision Real (R*4) - MSB (bit 0) is the sign bit (positive), bit 1-7 is the exponent in excess-64 notation format, and bit 8-31 is the fraction field. An example may be helpful:

Starting with 4180 69E8 (hex), the sign bit = 0 (positive), the exponent = +1 [e.g. 41 (hex) converted to 65 (dec) - 64 (excess 64 notation) = +1], and the fraction 8069E8 (hex) shifted by exponent of +1 gives 8.069E8 (hex). To convert 8.069E8 (hex) to decimal, start with the whole number 8 (hex) which in this case equals 8 (dec). Next, the precision of the fraction .069E8 must be noted. This fraction has 5 digits of precision. Next, the fraction portion in hex (069E8) is converted to decimal (27112) and divided by 16 raised to the power of the precision of the fraction (5). In other words $27112/(16^{**}5) =$ .02585 plus the whole number 8, gives 8.02585 in decimal.

DATA RECORDS:

Within the data file, base data and control/response messages contained within the data file are stored using a variable record length structure. The convention here is to begin with byte 0 as the first byte. Included as the first record of each data file is a volume scan title containing the following information:

Bytes	Format	Description
0-8	C*9	Filename (root) - "ARCHIVE2."
9-11	C*3	Filename (extension) - "1", "2", etc.
12-15	I*4	Modified Julian Date referenced from 1/1/70
16-19	I*4	Time - Milliseconds of day from midnight (GMT) when file was created.
20-23		Unused

All remaining records in the data file are composed of data and command/response messages which are initially stored in separate 2432 byte packets within an RDA memory buffer. During the archive process the packets are copied from memory and grouped together to form a record. Record lengths are variable and are always sized in multiples of the 2432 byte packets. During the reblocking process, physical records are set to 31616 bytes (2432 x 13).

The following example shows a portion of one packet which includes Concurrent computer Channel Terminal Manager (CTM) information, a message header, and a digital radar data message containing reflectivity only.

```
ØØØØ ØØØØ Ø98Ø ØØØØ ØØØ2 ØØØØ Ø4B8 ØØØ1
ØØ6Ø 1E9E Ø4BØ 1841 ØØØ1 ØØØ1 Ø48Ø 14A2
1E9E 1234 653Ø ØØ59 ØØØ1 ØØ58 ØØØ1 ØØØØ
FE89 Ø3E8 ØØFA Ø1CC ØØØØ ØØØ1 418Ø 69E8
ØØ64 ØØØØ ØØØØ ØØØØ ØØ15 ØØØØ ØØØØ ØØØØ
ØØØØ ØØ64 ØØØØ ØØØØ ØØØØ FFF4 ØØ64 ØØØØ
ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ
ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ
ØØ5A 5AØØ ØØ7Ø 6D51 6455 6Ø6Ø 4F54 ØØ4Ø
5C3F 4Ø49 49ØØ 4D42 4349 434E 4B3D 443Ø
434Ø 3F3D 4644 4443 3A3D 473F 3A3A 3D3D
3C45 3A43 433C 3E43 413C 393F 3F4Ø 4Ø38
        (etc.)
```

Using the above example, each portion of the packet is described in detail.
Remember, this packet may be one of several contained in one record within the
data file.

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        Bytes Ø-11 (halfwords 1-6)
```
ØØØØ ØØØØ Ø98Ø ØØØØ ØØØ2 ØØØØ Ø4B8 ØØØ1
ØØ6Ø 1E9E Ø4BØ 1841 ØØØ1 ØØØ1 Ø48Ø 14A2
1E9E 1234 653Ø ØØ59 ØØØ1 ØØ58 ØØØ1 ØØØØ
FE89 Ø3E8 ØØFA Ø1CC ØØØØ ØØØ1 418Ø 69E8
ØØ64 ØØØØ ØØØØ ØØØØ ØØ15 ØØØØ ØØØØ ØØØØ
ØØØØ ØØ64 ØØØØ ØØØØ ØØØØ FFF4 ØØ64 ØØØØ
ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ
ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ
ØØ5A 5AØØ ØØ7Ø 6D51 6455 6Ø6Ø 4F54 ØØ4Ø
5C3F 4Ø49 49ØØ 4D42 4349 434E 4B3D 443Ø
434Ø 3F3D 4644 4443 3A3D 473F 3A3A 3D3D
3C45 3A43 433C 3E43 413C 393F 3F4Ø 4Ø38
     (etc.)
```

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Channel Terminal Manager
(CTM) information.
Archive II is a copy of
messages or data packets
prepared for transmission
from the RDA to the RPG.
CTM information is attached
to a message or data packet
for checking data integrity
during the transmission
process and is of no
importance to the base data
(omit or read past these
bytes).

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        Bytes 12-27 (halfwords 7-14)
```
ØØØØ ØØØØ Ø98Ø ØØØØ ØØØ2 ØØØØ Ø4B8 ØØØ1
ØØ6Ø 1E9E Ø4BØ 1841 ØØØ1 ØØØ1 Ø48Ø 14A2
1E9E 1234 653Ø ØØ59 ØØØ1 ØØ58 ØØØ1 ØØØØ
FE89 Ø3E8 ØØFA Ø1CC ØØØØ ØØØ1 418Ø 69E8
ØØ64 ØØØØ ØØØØ ØØØØ ØØ15 ØØØØ ØØØØ ØØØØ
ØØØØ ØØ64 ØØØØ ØØØØ ØØØØ FFF4 ØØ64 ØØØØ
ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ
ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ
ØØ5A 5AØØ ØØ7Ø 6D51 6455 6Ø6Ø 4F54 ØØ4Ø
5C3F 4Ø49 49ØØ 4D42 4349 434E 4B3D 443Ø
434Ø 3F3D 4644 4443 3A3D 473F 3A3A 3D3D
3C45 3A43 433C 3E43 413C 393F 3F4Ø 4Ø38
     (etc.)
```

Message Header. This information is used to
identify either base data or one of thirteen
types of messages that may follow in bytes 28-
2431. This header includes the following
information:

Halfword   **Format**   **Description**

7

| 7 | I*2 | Message size in halfwords measured from this halfword to end of record. |

| 8 | I*1 | (Left Byte) Channel ID: |

                  0 = Non-Redundant Site
                  1 = Redundant Site Channel 1
                  2 = Redundant Site Channel 2

| 8 | I*1 | (Right Byte) Message type, where: |

    1 = DIGITAL RADAR DATA (This message may contain a combination of either reflectivity, aliased velocity, or spectrum width)
    2 = RDA STATUS DATA.
    3 = PERFORMANCE/MAINTENANCE DATA.
    4 = CONSOLE MESSAGE - RDA TO RPG.
    5 = MAINTENANCE LOG DATA.
    6 = RDA CONTROL COMMANDS.
    7 = VOLUME COVERAGE PATTERN.
    8 = CLUTTER CENSOR ZONES.
    9 = REQUEST FOR DATA.
    1Ø = CONSOLE MESSAGE - RPG TO RDA.
    11 = LOOP BACK TEST - RDA TO RPG.
    12 = LOOP BACK TEST - RPG TO RDA.
    13 = CLUTTER FILTER BYPASS MAP - RDA to RPG.
    14 = EDITED CLUTTER FILTER BYPASS MAP - RPG to RDA.

| 9 | I*2 | I.D. Sequence = Ø to 7FFF, then roll over back to Ø. |

| 1Ø | I*2 | Modified Julian date starting from 1/1/7Ø. |

| 11-12 | I*4 | Generation time of messages in milliseconds of day past midnight (GMT). This time may be different than time listed in halfwords 15-16 defined below. |

| 13 | I*2 | Number of message segments. Messages larger than message size (halfword 7 defined above) are segmented and recorded in separate data packets. |

| 14 | I*2 | Message segment number. |

Bytes 28-127 (halfwords 15-64)

```
ØØØØ ØØØØ Ø98Ø ØØØØ ØØØ2 ØØØØ Ø4B8 ØØØ1
ØØ6Ø 1E9E Ø4BØ 1841 ØØØ1 ØØØ1 Ø48Ø 14A2
1E9E 1234 653Ø ØØ59 ØØØ1 ØØ58 ØØØ1 ØØØØ
FE89 Ø3E8 ØØFA Ø1CC ØØØØ ØØØ1 418Ø 69E8
ØØ64 ØØØØ ØØØØ ØØØØ ØØ15 ØØØØ ØØØØ ØØØØ
ØØØØ ØØ64 ØØØØ ØØØØ ØØØØ FFF4 ØØ64 ØØØØ
ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ
ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ
ØØ5A 5AØØ ØØ7Ø 6D51 6455 6Ø6Ø 4F54 ØØ4Ø
5C3F 4Ø49 49ØØ 4D42 4349 434E 4B3D 443Ø
434Ø 3F3D 4644 4443 3A3D 473F 3A3A 3D3D
3C45 3A43 433C 3E43 413C 393F 3F4Ø 4Ø38
     (etc.)
```

Digital Radar Data Header. This information describes the date, time, azimuth, elevation, and type of base data included in the radial. This header includes the following information:

Halfword	Format	Description
15-16	I*4	Collection time for this radial in milliseconds of day past midnight (GMT).
17	I*2	Modified Julian date referenced from 1/1/7Ø.
18	I*2	Unambiguous range (scaled: Value/1Ø. = KM).
19	I*2	Azimuth angle (coded: [Value/8.]*[18Ø./4Ø96.] = DEG). An azimuth of "Ø degrees" points to true north while "9Ø degrees" points east. Rotation is always clockwise as viewed from above the radar.
2Ø	I*2	Radial number within the elevation scan.
21	I*2	Radial status where: Ø = START OF NEW ELEVATION. 1 = INTERMEDIATE RADIAL. 2 = END OF ELEVATION. 3 = BEGINNING OF VOLUME SCAN. 4 = END OF VOLUME SCAN.
22	I*2	Elevation angle (coded: [Value/8.]*[18Ø./4Ø96.] = DEG). An elevation of "Ø degree" is parallel to the pedestal base while "9Ø degrees" is perpendicular to the pedestal base.
23	I*2	RDA elevation number within the volume scan.
24	I*2	Range to first gate of reflectivity data (METERS). Range may be negative to account for system delays in transmitter and/or receiver components.
25	I*2	Range to first gate of Doppler data. Doppler data - velocity and spectrum width (METERS). Range may be negative to account for system delays in transmitter and/or receiver components.
26	I*2	Reflectivity data gate size (METERS).
27	I*2	Doppler data gate size (METERS).
28	I*2	Number of reflectivity gates.
29	I*2 gates.	Number of velocity and/or spectrum width data
3Ø	I*2	Sector number within cut.
31-32	R*4	System gain calibration constant (dB biased).
33	I*2	Reflectivity data pointer (byte # from start of digital radar data message header). This pointer locates beginning of reflectivity data.
34	I*2	Velocity data pointer (byte # from start of digital radar data message header). This pointer locates

		beginning of velocity data.

35	I*2	Spectrum width pointer (byte # from start of digital radar data message header). This pointer locates beginning of spectrum width data.

36	I*2	Doppler velocity resolution.

Value of: 2 = Ø.5 m/s
4 = 1.Ø m/s

37	I*2	Volume coverage pattern.

Value of: 11 = 16 elev. scans/ 5 mins.
21 = 11 elev. scans/ 6 mins.
31 = 8 elev. scans/ 1Ø mins.
32 = 7 elev. scans/ 1Ø mins.

38-41		Unused. Reserved for V&V Simulator.

42	I*2	Reflectivity data pointer for Archive II playback. Archive II playback pointer used exclusively by RDA.

43	I*2	Velocity data pointer for Archive II playback. Archive II playback pointer used exclusively by RDA.

44	I*2	Spectrum width data pointer for Archive II playback. Archive II playback pointer used exclusively by RDA.

45	I*2	Nyquist velocity (scaled: Value/1ØØ. = M/S).

46	I*2	Atmospheric attenuation factor (scaled: [Value/1ØØØ. = dB/KM]).

47	I*2	Threshold parameter for minimum difference in echo power between two resolution volumes for them not to be labeled range ambiguous (i.e., overlaid) [Value/1Ø. = Watts].

48-64		Unused.

Bytes 128-2431 (halfwords 65-1216)
```
ØØØØ ØØØØ Ø98Ø ØØØØ ØØØ2 ØØØØ Ø4B8 ØØØ1
ØØ6Ø 1E9E Ø4BØ 1841 ØØØ1 ØØØ1 Ø48Ø 14A2
1E9E 1234 653Ø ØØ59 ØØØ1 ØØ58 ØØØ1 ØØØØ
FE89 Ø3E8 ØØFA Ø1CC ØØØØ ØØØ1 418Ø 69E8
ØØ64 ØØØØ ØØØØ ØØØØ ØØ15 ØØØØ ØØØØ ØØØØ
ØØØØ ØØ64 ØØØØ ØØØØ ØØØØ FFF4 ØØ64 ØØØØ
ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ
ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ ØØØØ
ØØ5A 5AØØ ØØ7Ø 6D51 6455 6Ø6Ø 4F54 ØØ4Ø
5C3F 4Ø49 49ØØ 4D42 4349 434E 4B3D 443Ø
434Ø 3F3D 4644 4443 3A3D 473F 3A3A 3D3D
3C45 3A43 433C 3E43 413C 393F 3F4Ø 4Ø38
     (etc.)
```

Base data. This information includes the three base data moments of reflectivity, aliased velocity, and spectrum width. Depending on the collection method, up to three base data moments may exist in this section of the packet (for this example, only reflectivity is present). Base data is coded and placed in a single byte and is archived in the following format:

65-294   BYTE   Reflectivity data (Ø – 46Ø gates) (coded: [((Value-2)/2.)-32. = dBZ], for Value of Ø or 1 see note below).

65-754   BYTE   Doppler velocity data (coded: for doppler velocity resolution of Ø.5 M/S, [((Value-2)/2.)-63.5 = M/S]; for doppler resolution of 1.Ø M/S, [(Value-2)-127.] = M/S], for Value of Ø or 1 see note below), (Ø – 92Ø gates). Starting data location depends on length ofthe reflectivity field, stop location depends on length of the velocity field. Velocity data is range unambiguous out to 23Ø KM.

65-1214   BYTE   Doppler spectrum width (coded: [((Value-2)/2.)-63.5 = M/S], for Value of Ø or 1 see note below), (Ø – 92Ø gates). Starting data location depends on length of the reflectivity and velocity fields, stop location depends on length of the spectrum width field. Spectrum width is range unambiguous out to 23Ø KM.

Four bytes of trailer characters referred to the Frame Check Sequence (FCS) follow the data. In cases where the three moments are not all present or the number of gates for each moment have been reduced, the record is padded out to a constant size of 1216 halfwords (2432 bytes) following the trailer characters.

Note: Any base data value of Ø is data below Signal to Noise Ratio (SNR) thresholds set for that specific base data. Any base data value of 1 is data considered range ambiguous (i.e., overlaid).

3.   **Start Date:** 19910605 1621Z

4.   **Stop Date:** Ongoing.

5.   **Coverage:** North America

     a. Southernmost Latitude: 18 N
     b. Northernmost Latitude: 67 N
     c. Westernmost Longitude: 126 W
     d. Easternmost Longitude: -65 E

6.   **How to Order Data:**

     Ask NCDC's Climate Services about the cost of obtaining this data set.
     Phone: 828-271-4800
     FAX: 828-271-4876
     E-mail: **NCDC.Orders@noaa.gov**

7.   **Archiving Data Center:**

     National Climatic Data Center
     Federal Building
     151 Patton Avenue
     Asheville, NC 28801-5001
     Phone: (828) 271-4800.

8.   **Technical Contact:**

     National Climatic Data Center
     Federal Building
     151 Patton Avenue
     Asheville, NC 28801-5001
     Phone: (828) 271-4800.

     NWS/Operational Support Facility
     Applications/Operations Branch
     1200 Westheimer Dr.
     Norman, OK 73069
     Phone: (405) 366-6530
     FAX: (405) 366-6550

9.   **Known Uncorrected Problems:** None.

10. **Quality Statement:** The WSR-88D is a very complex system. Program
modifications and engineering changes are rather constant features during the
phase-in process. Some early pre-production models experienced considerable
difficulties in the recording of Level II data. Even today, tapes are
received that contain spurious, erroneous, or illegal configurations. We have
attempted to recover as much data as possible from these problem tapes. The
user is cautioned that these anomalies may be encountered while reading the
archive tapes. Special care must be taken to ensure that illegal
configurations do not contaminate any summaries or statistical studies.

NCDC will be glad to assist in solving problems encountered in reading the
tapes, but technical questions about the data themselves must be addressed to
the:

     NWS/Operational Support Facility
     Applications/Operations Branch
     1200 Westheimer Dr.
     Norman, OK 73069

     Telephone: (405) 366-6530
     FAX: (405) 366-6550

11. **Essential Companion Datasets:** None.

12. **References:** No information provided with original documentation.
Definitive information about all aspects of the Doppler radar is contained in
Federal Meteorological Handbook -11 (FMH-11), Volumes A through D. These may
be ordered from the National Climatic Data Center.